AMENDMENTS TO THE CLAIMS

Claim 1. (Currently Amended) An apparatus, comprising:

a substrate;

a first layer of waveguiding material above the substrate, the first layer having a first index of refraction, a first horizontal dimension, and a first vertical dimension; and

a second layer of waveguiding material adjacent the first layer, the second layer having a second index of refraction, a second horizontal dimension, and a second vertical dimension, wherein the first index of refraction, the first horizontal dimension, the first vertical dimension, the second index of refraction, the second horizontal dimension, the second vertical dimension and the arrangement of the first and second layer are arranged to perform an optical mode transformation of light input into the strip loaded waveguide apparatus.

Claim 2. (Currently Amended) The apparatus of claim 1, wherein the optical mode transformation transforms an initial electromagnetic mode into a selected electromagnetic mode that propagates in a portion of the first layer approximately defined by at least one of the second horizontal dimension, the first vertical dimension, the first index of refraction, and the second index of refraction.

Claim 3. (Original) The apparatus of claim 2, wherein the selected electromagnetic mode is a selected polarization mode.

Claim 4. (Original) The apparatus of claim 3, wherein the selected polarization mode is a transverse electric mode.

Claim 5. (Original) The apparatus of claim 1, wherein the second vertical dimension is smaller than the first vertical dimension, the second horizontal dimension is smaller than the first

horizontal dimension, and the second index of refraction is larger than the first index of refraction.

Claim 6. (Original) The apparatus of claim 5, wherein the second vertical dimension is approximately 350 angstroms.

Claim 7. (Original) The apparatus of claim 5, wherein the first index of refraction is approximately 1.5 and the second index of refraction is approximately 2.

Claim 8. (Original) The apparatus of claim 1, wherein the substrate is a CMOS chip substrate.

Claim 9. (Original) The apparatus of claim 1, further comprising an upper cladding layer above the second layer and at least a portion of the first layer.

Claim 10. (Original) The apparatus of claim 1, further comprising an active element above a portion of the second layer, the active element having a third index of refraction such that a portion of the selected electromagnetic mode propagates in the active element.

Claim 11. (Original) The apparatus of claim 10, wherein the active element comprises at least one of an electro-optically active element and a magneto-optically active element.

Claim 12. (Original) The apparatus of claim 10, further comprising a plurality of electrodes deployed proximate the active element and capable of providing an electric field to the active element.

Claim 13. (Currently Amended) An apparatus, comprising:

a substrate;

a first layer of waveguiding material above the substrate, the first layer having a first index of refraction;

a second layer of waveguiding material above the first layer, the second layer having a second index of refraction; and

an active element above a portion of the second layer, the active element having a third index of refraction selected such that a portion of the selected electromagnetic mode propagates in the active element, wherein the first index of refraction, the second index of refraction, the third index of refraction and the arrangement of the first and second layers and the active element are selected such that the apparatus performs an optical mode transformation of light input into the apparatus.

Claim 14. (Original) The apparatus of claim 13, wherein the selected electromagnetic mode is a selected polarization mode.

Claim 15. (Original) The apparatus of claim 14, wherein the selected polarization mode is a transverse electric mode.

Claim 16. (Original) The apparatus of claim 13, wherein the first layer of waveguiding material has a first horizontal dimension and a first vertical dimension, wherein the second layer of waveguiding material has a second horizontal dimension and a second vertical dimension, and wherein the second vertical dimension is smaller than the first vertical dimension and the second horizontal dimension is smaller than the first horizontal dimension.

Claim 17. (Original) The apparatus of claim 16, wherein the second index of refraction is larger than the first index of refraction such that a selected electromagnetic mode propagates in a portion of the first layer approximately defined by the second horizontal dimension and the first vertical dimension.

Claim 18. (Original) The apparatus of claim 13, wherein the third index of refraction is intermediate the first and second indices of refraction.

Claim 19. (Original) The apparatus of claim 13, wherein the third index of refraction is larger than the first and second indices of refraction.

Claim 20. (Original) The apparatus of claim 13, wherein the active element comprises at least one of an electro-optically active element and a magneto-optically active element.

Claim 21. (Original) The apparatus of claim 13, wherein the third index of refraction is variable within a range of indices of refraction in response to an electric field applied to the active element.

Claim 22. (Original) The apparatus of claim 13, further comprising a plurality of electrodes deployed proximate the active element and capable of providing an electric field to the active element.

Claim 23. (Original) The apparatus of claim 13, wherein the active element has two ends, each end being tapered.

Claim 24. (Original) The apparatus of claim 13, further comprising an integrated circuit communicatively coupled to the first layer of waveguiding material.

Claim 25. (Original) The apparatus of claim 24, wherein the integrated circuit is communicatively coupled to at least one of the plurality of electrodes.

Claim 26. (Currently Amended) An method, comprising:

forming a first layer of waveguiding material above a substrate such that the first layer has a first index of refraction, a first horizontal dimension, and a first vertical dimension; and

forming a second layer of waveguiding material above the first layer such that the second layer has a second index of refraction, a second horizontal dimension, and a second vertical dimension, wherein forming the first and second layers comprises selecting the first index of refraction, the first horizontal dimension, the first

vertical dimension, the second index of refraction, the second horizontal dimension, the second vertical dimension and the arrangement of the first and second layer so that the first and second layers of waveguiding material perform an optical mode transformation of input light.

Claim 27. (Original) The method of claim 26, wherein forming the second layer comprises forming the second layer such that a selected electromagnetic mode propagates in a portion of the first layer approximately defined by the second horizontal dimension and the first vertical dimension.

Claim 28. (Original) The method of claim 27, wherein forming the second layer comprises forming the second layer such that second vertical dimension is smaller than the first vertical dimension, the second horizontal dimension is smaller than the first horizontal dimension, and the second index of refraction is larger than the first index of refraction.

Claim 29. (Original) The method of claim 26, further comprising forming an upper cladding layer above the second layer and at least a portion of the first layer.

Claim 30. (Original) The method of claim 26, further comprising forming an active element above a portion of the second layer, the active element having a third index of refraction such that a portion of the selected electromagnetic mode propagates in the active element.

Claim 31. (Original) The method of claim 30, wherein forming the active element comprises forming at least one of an electro-optically active element and a magneto-optically active element.

Claim 32. (Original) The method of claim 30, further comprising forming a plurality of electrodes proximate the active element and capable of providing an electric field to the active element.

Claim 33. (Currently Amended) A method, comprising:

forming a first layer of waveguiding material above a substrate, the first layer having a first index of refraction, a first horizontal dimension, and a first vertical dimension;

forming a second layer of waveguiding material above the first layer, the second layer having a second index of refraction, a second horizontal dimension, and a second vertical dimension, the second vertical dimension being smaller than the first vertical dimension, the second horizontal dimension being smaller than the first horizontal dimension, and the second index of refraction being larger than the first index of refraction such that a selected electromagnetic mode propagates in a portion of the first layer approximately defined by the second horizontal dimension and the first vertical dimension; [[and]]

forming an active element above a portion of the second layer, the active element having a third index of refraction such that a portion of the selected electromagnetic mode propagates in the active element; and

inputting light in an initial electromagnetic mode into a strip loaded waveguide formed by the first layer, the second layer and the active element and transforming the input light into the selected electromagnetic mode.

Claim 34. (Original) The method of claim 33, wherein forming the active element comprises forming the active elements having the third index of refraction that is intermediate the first and second indices of refraction.

Claim 35. (Original) The method of claim 33, wherein forming the active element comprises forming the active elements having the third index of refraction that is larger than the first and second indices of refraction.

Claim 36. (Original) The method of claim 33, wherein forming the active element comprises forming at least one of an electro-optically active element and a magneto-optically active element.

Claim 37. (Original) The method of claim 33, wherein forming the active element comprises forming the active elements having the third index of refraction that is variable within a range of indices of refraction in response to an electric field applied to the active element.

Claim 38. (Original) The method of claim 33, further comprising forming a plurality of electrodes proximate the active element and capable of providing an electric field to the active element.

Claim 39. (Currently Amended) A system for transforming optical wave modes, comprising:

an optical wave mode transformer optically coupled to a light source that is configured to emit light in an initial electromagnetic mode, the optical wave mode transformer comprising:

a first layer of waveguiding material above [[the]] a substrate, the first layer having a first index of refraction, a first horizontal dimension, and a first vertical dimension; and

a second layer of waveguiding material above the first layer, the second layer having a second index of refraction, a second horizontal dimension, and a second vertical dimension; and

an optical element that is optically coupled to the optical wave mode transformer to receive [[the]] a selected electromagnetic mode, wherein the first index of refraction, the first horizontal dimension, the first vertical dimension, the second index of refraction, the second horizontal dimension, the second vertical dimension and the arrangement of the first and second layer are arranged to perform an optical mode transformation of the light input into the strip optical mode wave transformer from the light source so that the selected electromagnetic mode differs from the initial electromagnetic mode.

Claim 40. (Original) The system of claim 39, wherein at least one of the first index of refraction, the first horizontal dimension, the first vertical dimension, the second index of refraction, the second horizontal dimension, and the second vertical dimension are selected such

that a selected electromagnetic mode provided by the light source propagates in a portion of the first layer approximately defined by the second horizontal dimension and the first vertical dimension.

Claim 41. (Original) The system of claim 40, wherein the second vertical dimension is smaller than the first vertical dimension, the second horizontal dimension is smaller than the first horizontal dimension, and the second index of refraction is larger than the first index of refraction.

Claim 42. (Original) The system of claim 41, wherein the optical wave mode transformer further comprises:

an active element above a portion of the second layer, the active element having a third index of refraction such that a portion of the selected electromagnetic mode propagates in the active element; and

a plurality of electrodes deployed proximate the electro-optically active element and capable of providing an electric field to the electro-optically active element.

Claim 43. (Original) The system of claim 39, wherein the active element comprises at least one of an electro-optically active element and a magneto-optically active element.